Carbon balance in two resprouting species suffering from massive xylem embolism

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Abstract:

The comparison of seedlings of two resprouting species *Quercus ilex* – an evergreen species adapted to dry environments – and *Ulmus minor* – a deciduous riparian tree – subjected to water withholding revealed that higher tolerance to drought of the former species relies on the capacity to maintain a positive carbon balance in the long-term, but specially on the capacity to delay dehydration and xylem cavitation under soil water limitations, together with a higher resistance of the xylem to endure high tension. Seedlings of both species showed symptoms of decline at the same loss of root hydraulic conductivity (≈80%) but with *Q. ilex* reaching that level much later into the drought treatment than *U. minor* and at 2MPa lower xylem water potential. The common hydraulic failure in dying seedlings of both species was associated to a variable depletion of carbohydrates reserves, due to distinct accumulation before drought, and variable sensitivity of plant gas-exchange and phloem transport to water stress between species.

Shedding leaves during drought periods can provide a mechanism to avoid plant dehydration, but could also represent one particular case of increased likelihood of plants to die from carbon starvation.